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(56) Documents Cited

US 5232067 A US 5094320 A US 3998293 A

(58) Field of Search

UK CL (Edition O) E1S SLE SLF SLM SLW3 SLW4  
INT CL<sup>6</sup> E06C 1/12 7/42 7/44

(54) Ladder leveller

(57) A levelling device that enables a ladder (4) to be positioned on uneven ground comprises a primary channel member (1), a threaded member (2) and a fixing means (5). Threaded member (2) passes through a hollow rung (3) of the ladder (4) to extend through an elongate slot in the primary channel member (1). Primary channel member (1) is adjusted along the length of the slot to provide leg (41) with a required degree of extension before being held in position by fixing means (5). When a load is applied to the ladder (4) fixing means (5) automatically tightens further. Clamp (6) is of channel type construction and acts to spread the load exerted by tightening fixing means (5). A secondary channel member comprising a number of holes may be used to extend the second leg (42) of the ladder (4) by predetermined amounts. A solid rung ladder may be adapted by providing a hollow bottom rung for attachment to the ladder.

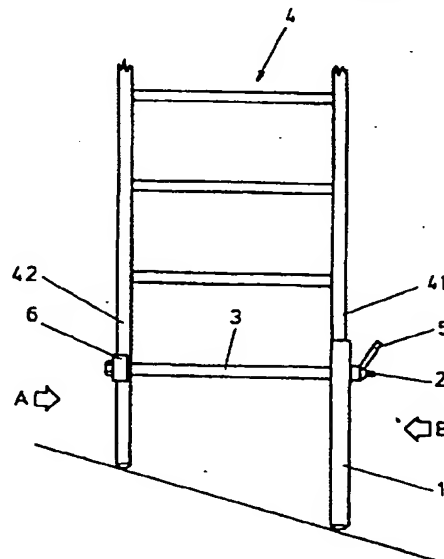


FIG. 1

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

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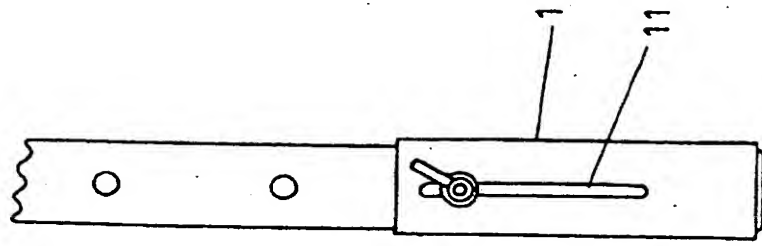


FIG. 3

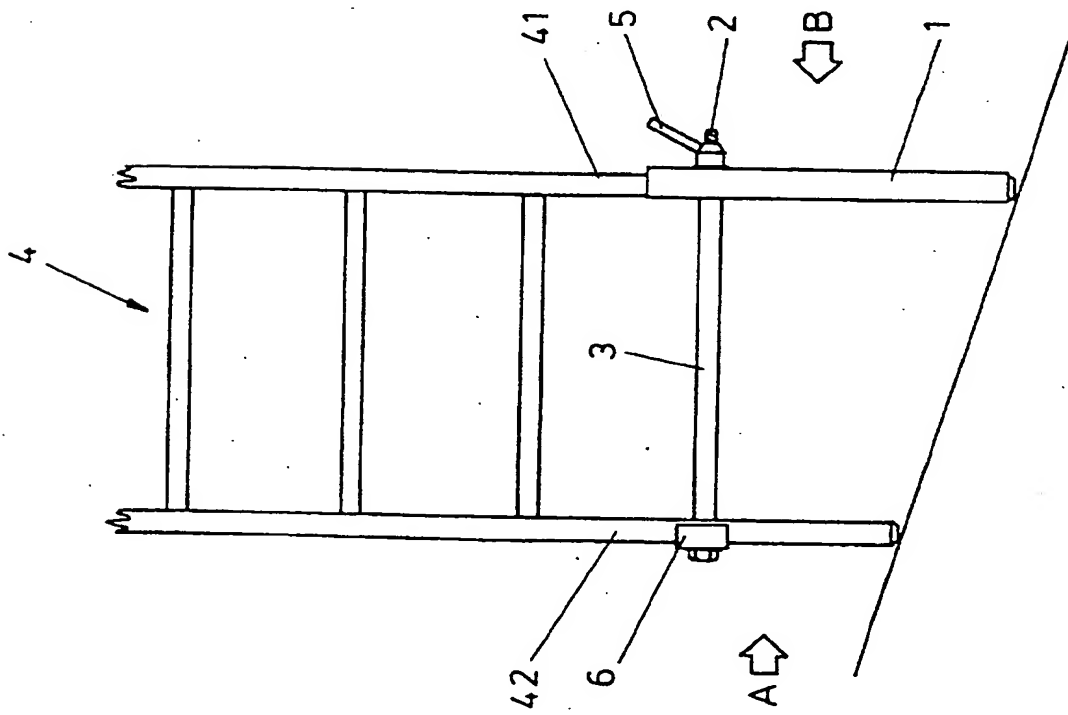


FIG. 1

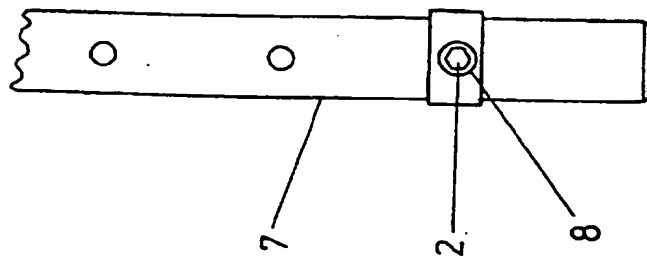


FIG. 2

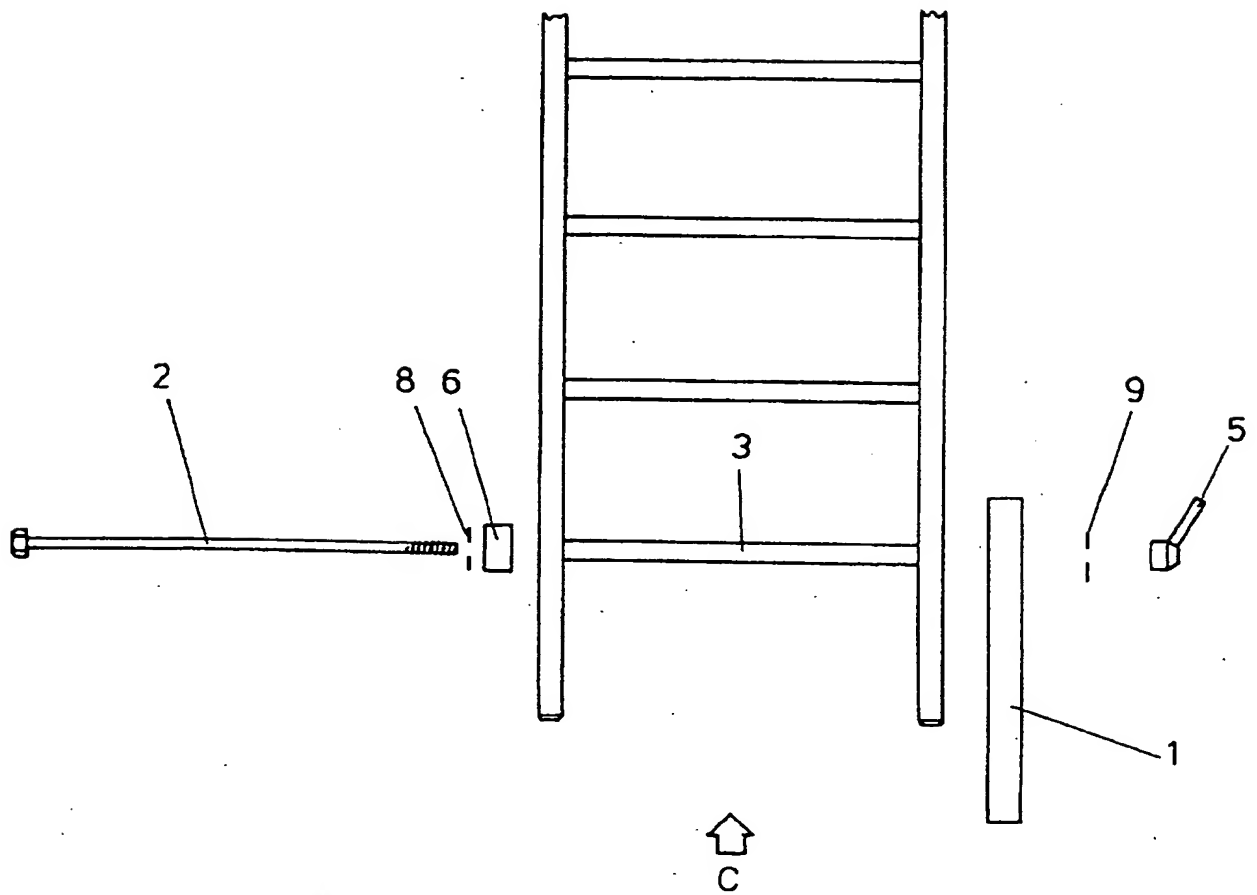


FIG. 4

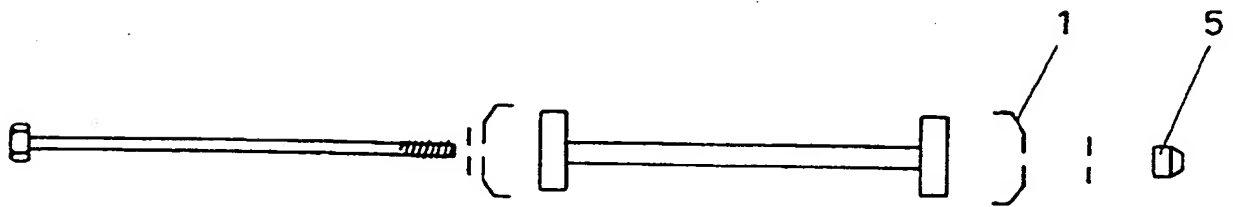


FIG. 5

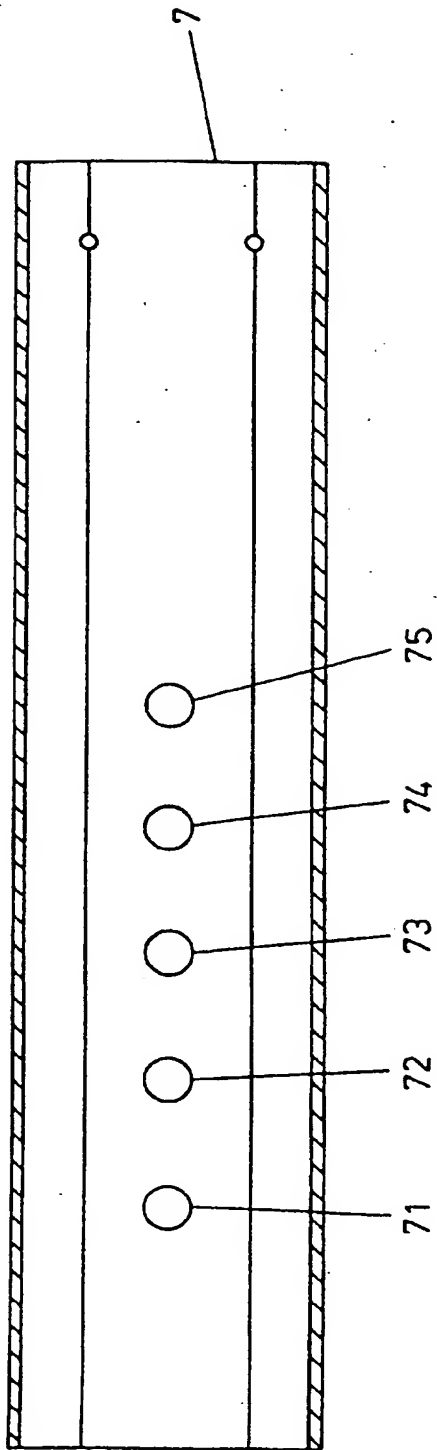


FIG. 8

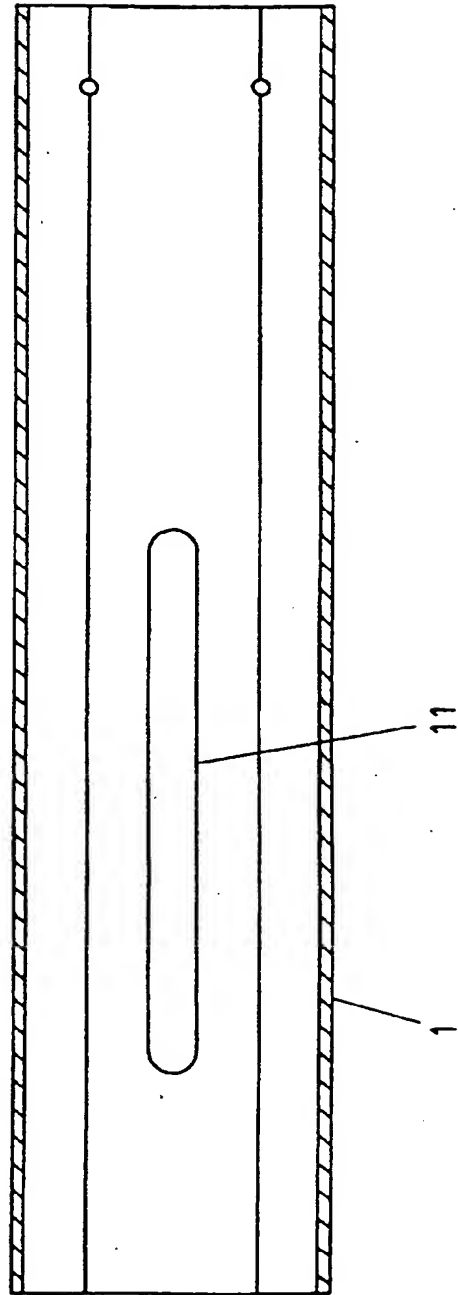


FIG. 6

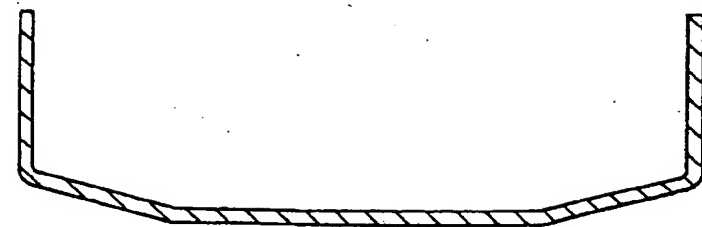


FIG. 9B

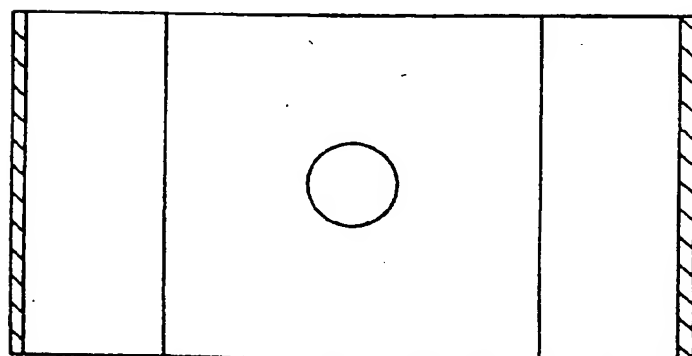


FIG. 9A

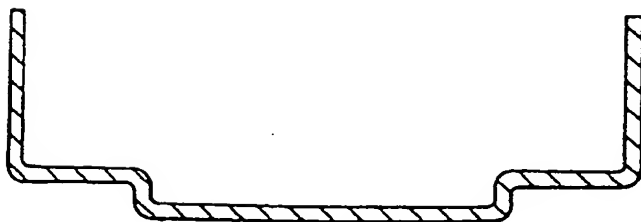


FIG. 7

6

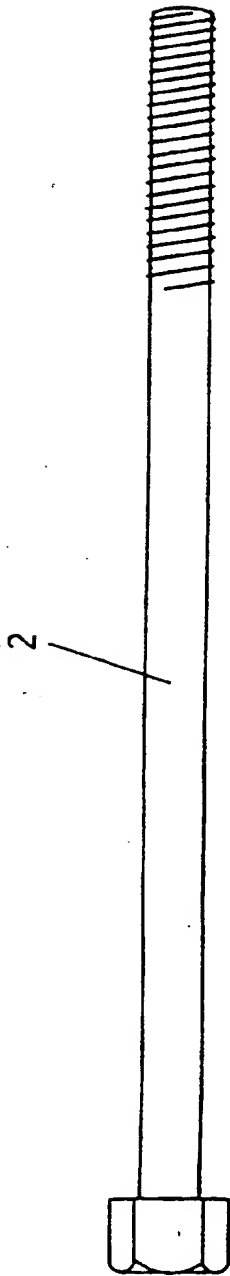


FIG. 12

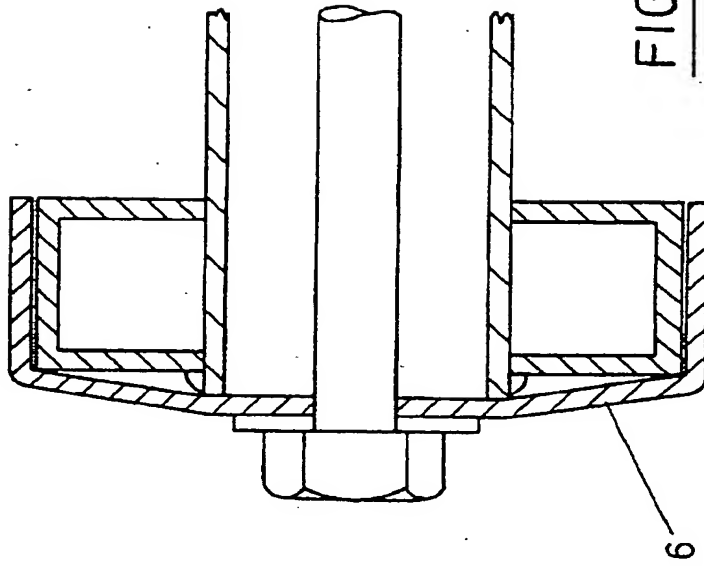


FIG. 11

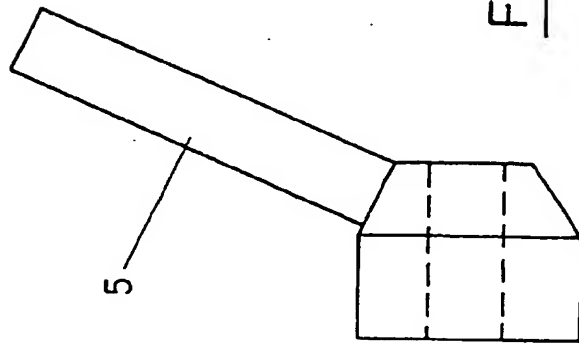


FIG. 10

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LADDER LEVELLER

The invention relates to a ladder leveller for enabling a ladder to be positioned stably on uneven or sloping ground.

Many ladder levelling devices have been proposed in the prior art. Examples of such devices are shown in United States patents: US 3,933,222; US 3,998,293 and US 5,064,024 for instance. Each of these prior art devices perform the basic function of enabling one leg to be extended with respect to the other leg of the ladder to compensate for sloping or uneven ground.

The first of the abovementioned documents discloses an arrangement which enables the extension of one of the legs by means of a spring loaded mechanism which is selectively engagable in one of a number of holes formed in a side plate of one of the legs of the ladder so as to enable its extension. However, this arrangement is severely limited in that the degree of extension is determined by the spacing of the holes. Therefore, in certain instances, it may not be possible to set up the ladder in a safe position. Also, the mechanism is quite complicated and, for its safety, depends upon the construction of the spring loaded pin. If that pin should fail then not only would the system be inoperable but, if it snapped in use, the consequences for the person up the ladder would be potentially disastrous.

30

In the second of the abovementioned prior art documents, there is proposed a system for use with a hollow rung ladder which utilises a bolt which passes into the ladder rung to one side of the ladder, passes out of the rung on the other side of the ladder and cooperates

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with a channel shaped plate on that other side, the plate having a number of spaced apart holes punched therein. The degree of extension depends upon which of the holes in the shaped plate is selected. This system is safer than  
5 the first mentioned system in that a very substantial bolt may be used in order to secure the extension in place. However, it is still limited by the fact that the degree of extension of the leg is determined by the spacing of the holes formed in a channel member to one side of the  
10 ladder. It is also rather cumbersome in that the degree of extension of the extendable leg needs to be selected in advance since it is difficult to remove the bolt and reposition the plate on site. If the degree of extension required has been wrongly guessed then the ladder must be  
15 laid on its side to allow re-adjustment of the mechanism.

It will be seen that the above mentioned two prior art documents have, amongst their drawbacks, the fact that their range of adjustment is determined by the spacing of  
20 holes formed in a channel member to one side of the ladder. The third document US 5,064,024 partially addresses this problem by providing an infinitely variable adjustment system which operates on the principle of providing a first member attached to the ladder leg to be  
25 extended, this first member being permanently attached and provided with a file like element having a rough surface and a second member which is attachable in sliding relation to the fixed member and having a pair of rotatable bolts for engagement with the file like surface  
30 of the first element. It is claimed by the patent proprietor of this prior art document that this provides a very safe and reliable arrangement giving infinitely variable adjustment. Whilst this may be so, the arrangement does have disadvantages in that the  
35 construction is quite complicated and relatively expensive



and is particularly adapted for use with wooden ladders as it requires the file like element to be bolted to one leg, in permanent relation thereto. Also, because of its construction it will damage the ladder to which it is attached and the file element will, in use, become clogged with debris and wear out.

In view of the above, it can be seen that there is a need, which is as yet unfulfilled, for a simplified ladder levelling apparatus which is infinitely adjustable, cheap to construct and readily utilisable with modern hollow rung type ladders.

According to a first aspect of the invention, there is provided a ladder leveller device comprising:

an elongate threaded member for insertion into a hollow rung of a ladder;

a primary member having a profile adapted to cooperate with a first leg of the ladder and having an elongate slot formed therein; and

fixing means,

the ladder leveller being arranged, in use, such that the threaded member is insertable into a hollow rung of the ladder to protrude from either end thereof, one end of the threaded member being arranged to extend through the elongate slot of the primary member and the fixing means being arranged to fix the primary member in a predetermined relation with the first ladder leg to provide a required degree of extension of the first ladder leg with respect to the second.

Preferably, the threaded member comprises a bolt or screw which is at least partially threaded along its length. The threaded member is preferably arranged to be a snug fit within the hollow rung. In many applications,  
5 the threaded member may be an M12 steel bolt, 450mm in length.

The fixing means is preferably arranged, in use, so as to automatically tighten when load is applied to the  
10 ladder. The fixing means may comprise a nut and one or more washers. Preferably, the nut is a wing nut. The nut may have a single handle fixed thereto for tightening the device. A serrated washer may be provided to be fitted over the threaded member between the nut and the channel  
15 member.

The fixing means may further comprise a clamp plate for positioning between a head of the threaded member and the other ladder leg. The fixing means may also comprise  
20 a serrated washer positionable between the head and the clamp plate.

The leveller device may further comprise a secondary member for cooperation with the other ladder leg, the  
25 secondary member having a plurality of longitudinally spaced apart holes formed therein for providing a predetermined degree of extension to the other leg. The primary member and, where provided, the secondary member are preferably of a channel construction.

30

According to a second aspect of the invention, there is provided a ladder fitted with the device of the first aspect.

According to a third aspect, there is provided a kit of parts for equipping a ladder with a levelling device, the kit comprising:

5           an elongate threaded member for insertion into a hollow rung;

          a primary member for association with a first ladder leg, the primary member having an elongate slot formed  
10       therein; and

          fixing means for fixing the primary member to the first ladder leg and the threaded member in order to provide a desired degree of extension to the first ladder  
15       leg with respect to the ladders second leg.

          The kit may further comprise a secondary member having a predetermined number of holes formed therein for providing the second leg with a predetermined amount of  
20       extension.

          The kit may include a clamp plate, one or more washers and the fixing means is preferably a nut having at least one handle for manual tightening thereof.  
25

          The primary member and, where supplied, secondary member, are preferably of a channel type construction.

          Where the kit is to be used on a ladder other than a  
30       hollow rung ladder it is preferred that the kit further includes a hollow rung to adapt the ladder.

          According to a fourth aspect of the invention, there is provided a ladder levelling device for use on uneven  
35       ground, the device comprising means for providing an

infinitely variable level of adjustment to a first ladder leg and means for providing a predetermined degree of extension to a second ladder leg.

5       The invention of the fourth aspect is particularly advantageous when setting up a ladder on severely uneven ground whereby the uneven nature of the ground between the first and second ladder legs could otherwise impinge upon a lowermost ladder rung.

10

      The invention of the fourth aspect may further comprise any one or more features disclosed in the accompanying description, claims, abstract or figures, in any combination.

15

      For a better understanding of the invention, and to show how embodiments of the same may be carried into effect, reference will now be made, by way of example, to the accompanying diagrammatic drawings, in which:

20

      Figure 1 is a front view of a ladder leveller device in accordance with an embodiment of the invention;

25

      Figure 2 is a side view from arrow A of Figure 1 of the embodiment;

      Figure 3 is a side view from arrow B of the embodiment of Figure 1;

30

      Figure 4 is an exploded view showing elements of the embodiment of Figure 1;

      Figure 5 is an exploded view similar to that of Figure 4 when viewed from arrow C of Figure 4;

35

Figure 6 is a plan view of a primary channel member of the embodiment of Figure 1;

5 Figure 7 is an end view of the primary channel member of Figure 6 and also represents an end view of a secondary channel member, which secondary channel member is shown in plan view in Figure 8;

10 Figure 9A and Figure 9B are respectively a plan view and an end view of a clamp part of the Figure 1 embodiment;

Figure 10 shows a nut of the leveller device;

15 Figure 11 is a part sectional view showing a threaded member of the device, clamp member and one leg of a ladder to which the device is fitted; and

20 Figure 12 shows a bolt forming part of the ladder leveller device.

Referring initially to Figures 1 to 5, there is shown an embodiment of a ladder leveller device. The device comprises a primary channel member 1, a threaded member  
25 such as a bolt 2, which is insertable through the hollow rung 3 of a ladder shown generally at 4 and a fixing means comprising handled nut 5. In the embodiments shown, the device further comprises a clamp member 6, a secondary channel member 7 and serrated washers 8, 9.

30

The primary channel member 1, referring to Figures 1 to 5, 6 and 7 comprises an elongate piece of material having a channel like cross-section, such as that shown in Figure 7 and this formation provides the primary channel  
35 member with good strength qualities. The primary channel

member 1 includes an elongate slot 11 which, as will be explained later, provides an infinitely variable adjustment for extending a first leg 41 of the ladder 4.

5           Referring now to Figures 2 and 8, a secondary channel member 7 of the device is shown.

10           The secondary channel member 7 comprises a channel member having the same generalised cross-section as that of the primary channel member and as shown in Figure 7, but instead of having an elongate slot associated therewith, the secondary channel member has a number of holes 71 to 75 formed therein. The holes 71 to 75 are proportioned to allow the passage therethrough of the bolt  
15   2.

          Referring now to Figure 9A, Figure 9B and Figure 11, a clamp member 6 is shown. The clamp 6 is of channel type construction, but is significantly shorter in length than  
20   the primary and secondary channel members 1, 7. The essential function of the clamp member 6 is to provide a load bearing member which allows the nut 5 to be progressively tightened onto the bolt 2 (shown in Figure 12).

25

          Assembly and use of the ladder leveller device shown in the Figures, will now be described.

30           The device has a number of different operational modes. Firstly, it can be used as a device which simply provides one extendable leg to a normal hollow rung ladder. In this mode, the device comprises first channel member 1, bolt 2, nut 5, clamp plate 6 and serrated washers 8, 9. To assemble the device, the device is set up as shown in  
35   Figure 4 by aligning clamp plate 6 with leg 42 of ladder

4 and passing bolt 2 through washer 8 and clamp plate 6 and into hollow rung 3 of the ladder. The bolt 2 is pushed all the way through the hollow rung so that its threaded end emerges from the rung 3 of the ladder 4 to  
5 extend transversely from ladder leg 41. Primary channel member 1 is placed over the threaded end of the bolt 2, serrated washer 9 placed over the threaded end and then nut 5 loosely screwed onto the end of the threaded member.

10

As will best be seen from Figure 3, the assembled device, in this mode, gives a ladder having one leg 41 which is extendable with an infinitely variable adjustment by virtue of the primary channel member 1 and its slot 11.

15

Referring to Figure 1, a user, such as a workman or window cleaner when setting up the ladder on a slope can simply position the ladder at his desired working place,  
20 slacken off nut 5 to enable primary channel member 1 to let the "down hill" leg extend, before nut 5 is tightened up again with the ladder in a stable position. It should be noted that the construction proposed is such that when the nut 5 is moderately tightened a user standing on the  
25 ladder would have the effect of tightening the arrangement still further. In this way, a stable configuration is provided.

Features to note in the embodiment are that the  
30 primary channel member 1, being of a channel type construction is very stable and strong. Also, clamp plate 6 acts so as to spread the load exerted by tightening of nut 5 onto bolt 2 and also provides a degree of protection to the ladder 4 so that the device does not mark or  
35 adversely effect the ladder.

In some circumstances, the ground upon which it is desired to set up a ladder may be so uneven that the provision of a single infinitely variable extending leg is not sufficient since the underlying ground may foul the lowermost ladder rung 6. In such cases, the secondary channel member 7 may be employed. Secondary channel member 7 has a number of holes, 71 to 75, formed therein and may be used for extending the leg 42 of ladder 4 by fixed predetermined amounts. By using this fixed extension along with the infinitely variable extension provided by primary channel member 1, this second mode of usage provides a stable configuration for use on very irregular terrain.

It will be evident from the above that with a very small kit of necessary parts, a very versatile arrangement is provided by which a standard hollow rung ladder can be used on sloping or uneven terrain. Indeed, the kit of parts may be permanently connected to such a ladder, if so desired, by fixing the extending primary channel member 1 so that in a usual configuration no extension is provided, i.e. so that the ladder 4 rests on its own legs 41, 42 with the primary channel member 1 securely clamped out of the way so that it does not interfere. In this way, when a user encounters a situation whereby he wishes to set up a ladder on a slope, the nut 5 may be simply loosened to allow the channel member 1 to extend and then tightened again when the channel member 1 is in the desired position.

Embodiments of the device may be envisaged whereby a ladder is provided already equipped with the ladder leveller device. Alternatively, the leveller device may be supplied as a kit of parts for addition to a standard ladder. The secondary channel member 7 may either be



provided as an optional extra or, in deluxe versions, the secondary channel member could be already provided.

5       The kit may also include means for adapting a solid rung ladder by supplying a hollow bottom rung for attachment to the ladder.

10       The reader's attention is directed to all papers and documents which are filed concurrently with or previous to this specification in connection with this application and which are open to public inspection with this specification, and the contents of all such papers and documents are incorporated herein by reference.

15       All of the features disclosed in this specification (including any accompanying claims, abstract and drawings), and/or all of the steps of any method or process so disclosed, may be combined in any combination, except combinations where at least some of such features  
20       and/or steps are mutually exclusive.

25       Each feature disclosed in this specification (including any accompanying claims, abstract and drawings), may be replaced by alternative features serving the same, equivalent or similar purpose, unless expressly stated otherwise. Thus, unless expressly stated otherwise, each feature disclosed is one example only of a generic series of equivalent or similar features.

30       The invention is not restricted to the details of the foregoing embodiment(s). The invention extends to any novel one, or any novel combination, of the features disclosed in this specification (including any accompanying claims, abstract and drawings), or to any

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novel one, or any novel combination, of the steps of any method or process so disclosed.

CLAIMS

1. A ladder leveller device comprising:

5 an elongate threaded member for insertion into a hollow rung of a ladder;

a primary member having a profile adapted to cooperate with a first leg of the ladder and having an  
10 elongate slot formed therein; and

fixing means,

the ladder leveller being arranged, in use, such that  
15 the threaded member is insertable into the hollow rung of the ladder to protrude from either end thereof, one end of the threaded member being arranged to extend through the elongate slot of the primary member and the fixing means being arranged to fix the primary member in a  
20 predetermined relation with the first ladder leg to provide a required degree of extension of the first ladder leg with respect to the ladders second leg.

2. A device according to claim 1, wherein the threaded  
25 member comprises a bolt or screw which is at least partially threaded along its length.

3. A device according to claim 1 or 2, wherein the threaded member is arranged to be a snug fit within the  
30 hollow rung.

4. A device according to any of the preceding claims, wherein the fixing means is arranged, in use, so as to automatically tighten when load is applied to the ladder.

35

5. A device according to any of the preceding claims, wherein the fixing means comprises a nut.
6. A device according to claim 5, wherein the nut has a handle fixed thereto for tightening the device.
7. A device according to claim 5 or 6, wherein a serrated washer is provided to be fitted over the threaded member between the nut and the primary member.
8. A device according to any of the preceding claims, wherein the fixing means further comprises a clamp plate for positioning between a head of the threaded member and the second ladder leg.
9. A device according to claim 8, wherein a serrated wash is provided positionable between the head and the clamp plate.
10. A device according to any of the preceding claims, the device further comprising a secondary member for cooperation with the second ladder leg, the secondary member having a plurality of longitudinally spaced apart holes formed therein for providing a predetermined degree of extension to the second leg.
11. A device according to claim 10, wherein the secondary member is of a channel type construction.
12. A device according to any of the preceding claims, wherein the primary member is of a channel type construction.
13. A ladder fitted with the device of any of the preceding claims.

14. A kit of parts for equipping a ladder with a levelling device, the kit comprising:

5 an elongate threaded member for insertion into a hollow rung;

a primary member for association with a first ladder leg, the primary member having an elongate slot formed therein; and

10

fixing means for fixing the primary member to the first ladder leg and the threaded member in order to provide a desired degree of extension to the first ladder leg with respect to the ladders second leg.

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15. A kit according to claim 14, further comprising a secondary member having a predetermined number of holes formed therein for providing the second leg with a predetermined amount of extension.

20

16. A kit according to claim 15, wherein the secondary member is of a channel type construction.

25

17. A kit according to claim 14, or 15, further comprising a clamp plate.

18. A kit according to claim 14, 15 or 16, further comprising one or more washers.

30

19. A kit according to any of claims 14 to 17, wherein said fixing means is a nut.

20. A kit according to claim 18, wherein said nut has at least one handle for manual tightening thereof.

35

21. A kit according to any of claims 14 to 20, wherein the primary member is of a channel type construction.

5 22. A kit according to any of claims 14 to 21, further comprising a hollow rung to allow the kit to be used with a solid rung ladder.

10 23. A ladder leveller device for use on uneven ground, the device comprising means for providing an infinitely variable level of adjustment to a first ladder leg and means for providing a predetermined degree of extension to a second ladder leg.

15 24. A device according to claim 22, further comprising any one or more features disclosed in the accompanying description, claims, abstract or figures, in any combination.

20 25. A ladder leveller device substantially as herein described with reference to the accompanying drawings.

25 26. A ladder equipped with a ladder leveller device substantially as herein described with reference to the accompanying drawings.



Application No: GB 9618247.2  
Claims searched: 1 - 22, 25, 26

Examiner: Justin Black  
Date of search: 7 November 1996

**Patents Act 1977**  
**Search Report under Section 17**

**Databases searched:**

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK CI (Ed.O): E1S (SLE, SLF, SLM, SLW3, SLW4).

Int CI (Ed.6): E06C (1/12, 7/42, 7/44)

Other:

**Documents considered to be relevant:**

Category	Identity of document and relevant passage		Relevant to claims
X, Y	US 5232067	(GRIFFITH). See particularly figures 1 and 2, column 2 lines 22 - 38, and column 3 lines 3 - 7.	X: 1, 2, 5, 6, 13, 14, 17, 18, 19, 20.  Y: 3.
X, Y	US 5094320	(DEITZ). See particularly figure 1, column 2 lines 3 - 27, and column 1 lines 59 - 62.	X: 1, 2, 5 - 21.  Y: 3.
Y	US 3998293	(RAIA). See column 2 line 37 - 39.	3

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.